

# Memorandum

The City of Traverse City  
Engineering Department



TO: Timothy J. Lodge, P.E., City Engineer  
FROM: Jessica Cichowski, Engineering Technician *JC*  
DATE: November 26, 2013  
SUBJECT: Level of Service for Eighth St between Lake Ave and Boardman Ave  
Modified 4-Lane Cross Section with Shared Lanes, LOS+ Method

This memo is to formalize the initial findings of the City Engineering Department with regard to the predicted level of service (LOS) of Eighth St between Lake Ave and Woodmere Ave if this segment of Eighth St is converted to a three lane road with medians and designated turn lanes.

The LOS was determined using LOS+ (a hybrid traffic analysis method based on the Highway Capacity Manual 2010 and NCHRP Project 3-70) and traffic volume data collected by URS on October 18, 2011. The cross-section of the road was assumed to have a 12 to 14 foot eastbound lane, two 10.5 to 12 foot westbound lanes, and 10 foot designated center turn lanes/median. The signal cycle was assumed to provide through traffic green time to be 30% of the cycle length. Using this data the LOS for eastbound traffic and the LOS for westbound traffic on this segment of Eighth St, including bicycle, pedestrian, and transit LOS, was determined. See table below for details.

Eastbound Eighth St: Lake Ave to Boardman Ave Level of Service Summary		
	Lake Ave to Boardman Ave	Boardman Ave to Woodmere Ave
Auto LOS	C	B
Pedestrian LOS	C	C
Bicycle LOS	D	D
Transit LOS	D	D

Westbound Eighth St: Lake Ave to Boardman Ave Level of Service Summary		
	Lake Ave to Boardman Ave	Boardman Ave to Woodmere Ave
Auto LOS	C	B
Pedestrian LOS	B	C
Bicycle LOS	A	D
Transit LOS	D	D

Encl. LOS+ Multimodal Level of Service for Urban Streets Results Summary

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FROM: Jessica Cichowski, Engineering Technician *JC*  
DATE: November 26, 2013  
SUBJECT: Level of Service for Eighth St between Lake Ave and Boardman Ave  
Modified 4-Lane Cross Section with Shared Lanes, HCS 2010 Method

This memo is to formalize the initial findings of the City Engineering Department with regard to the predicted level of service (LOS) of Eighth St between Lake Ave and Woodmere Ave if this segment of Eighth St is converted to a three lane road with medians and designated turn lanes.

The LOS was determined using HCS 2010 (a traffic analysis tool based on the Highway Capacity Manual 2010) and traffic volume data collected by URS on October 18, 2011. The cross-section of the road was assumed to have a 12 to 14 foot eastbound lane, two 10.5 to 12 foot westbound lanes, and 10 foot designated center turn lanes/median and was assumed to be a class III highway. Using this data and an assumed traffic volume growth rate of 2% per year, the LOS for eastbound traffic and the LOS for westbound traffic on this segment of Eighth St, including bicycle LOS, was determined for 2013 and 2033. See table below for details.

Eighth St: Lake Ave to Boardman Ave Level of Service Summary		
	Eastbound	Westbound
2013 LOS	E	E
2013 % Capacity	31%	67%
2013 Bicycle LOS	D	E
2033 LOS	E	E
2033 % Capacity	46%	100%
2033 Bicycle LOS	E	E

Encl. Directional Two-Lane Highway Segment Worksheets  
HCM LOS Definitions

Highway Level of Service	
LOS	Description
A	Free-flow operation
B	Reasonably free flow. Ability to maneuver is only slightly restricted. Effects of minor incidents still easily absorbed.
C	Speeds at or near FFS. Freedom to maneuver is noticeably restricted. Queues may form behind any significant blockage.
D	Speeds decline slightly with increasing flows. Density increases more quickly. Freedom to maneuver is more noticeably limited. Minor incidents create queuing.
E	Operation near or at capacity. No usable gaps in the traffic stream. Operations extremely volatile. Any disruption causes queuing.
F	Breakdown in flow. Queues form behind breakdown points. Demand greater than capacity.



